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Rock-Based Fisher Safety Promotion: Five Years On

Kevin Moran

In 2006, a safety campaign was launched in Auckland, New Zealand to combat a spate of drowning incidents associated with fishing from rocky foreshores. This paper provides data from surveys of fishers from 2006 to 10 to determine if preventive behaviors have been adopted after five years of safety promotion. The most significant change in self-reported behavior related to the increased use of life jackets with 34% (95% CI = 0.25–0.44) of fishers in 2010 compared with 72% (95% CI = 0.66–0.77) in 2006 reporting never wearing a life jacket. Some risky behaviors (such as consuming alcohol) and at-risk attitudes (such as overconfidence in their local knowledge) persisted. The cultural and linguistic diversity of fishers, together with their transient participation, make them a difficult group to reach with education interventions, although changes in life jacket use were encouraging. Continuation of the safety campaign is recommended, and ways to further enhance fisher safety are discussed.

Rock-based fishing continues to be one of New Zealand's most dangerous pastimes. In the five years from 2005 to 2009, land-based fishing accounted for 25 drowning fatalities in New Zealand, 10% of all drowning incidents nationwide, and 29% of all beach-related fatalities (Water Safety New Zealand, 2010). New Zealand is not alone in its high fatal drowning toll. New Zealand's nearest neighbor, Australia, has recently reported similar incidents and concerns with 101 recreational fishing fatalities from 2000 to 2007, of which 62 fatalities occurred at beach/coastal locations (Crosariol, Vasica, & Franklin, 2010). This represents 10% of all Australian coastal drowning fatalities. Several Sydney black spots around Randwick and Sutherland (NSW) have been identified (Thompson, 2010).

In 2006, a fisher safety campaign was launched in the Auckland region of New Zealand to combat a spate of surf-related drowning incidents associated with fishing from rocky foreshores. The Auckland Regional Council (ARC), WaterSafe Auckland Inc (WAI), and Surf Life Saving Northern Region (SLSNR) jointly conducted a fishing safety campaign entitled the West Coast Fishing Safety Project in the summer of 2006. The purpose of that campaign was twofold. First, the campaign piloted a fishing safety education program that would help fishers identify and manage the risks associated with fishing on Auckland's rugged west coast. Second, a survey of fishers was conducted to enhance understanding of their fishing safety knowledge, beliefs, and behaviors.

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The 2006 survey revealed new and alarming statistics about risky behaviors that predisposed many fishers to harm in the highly dangerous locations where they fished. Many had limited safety skills and an overly optimistic view of their survival skills in a high-risk fishing environment (Moran, 2008). In terms of survival ability, one third ($n = 81$; 32%) of fishers estimated that they could swim nonstop 25 m or less. Most fishers reported limited/no ability to perform CPR ($n = 155$; 62%). Many took unnecessary risks when fishing from rocks. For example, almost one half ($n = 120$; 48%) had gone to the water's edge to retrieve a snagged line and one fifth ($n = 50$; 20%) admitted having consumed alcohol while fishing from rocks. Most fishers agreed that always wearing a life jacket made fishing a lot safer ($n = 177$; 71%), yet almost three quarters ($n = 180$; 72%) admitted that they never wore a life jacket. Fishing safety messages that address the twin dangers of overestimation of ability and underestimation of risk, especially at high-risk fishing locations, were recommended (Moran, 2008). The survey also revealed that the fishing population was culturally and linguistically diverse, was of recent residency, and were not frequent visitors to the sites where surveyed (Moran, 2006). The implications of this diversity, the transience of the population, and the remoteness of the site of activity were recognized barriers to be overcome in subsequent safety promotion.

The Auckland-based project was unique in that the fishing safety education program was conducted on-site at high-risk fishing locations with supplementary promotion of safety messages via relevant media outlets of television, radio, newspapers, and magazines as well as through retail outlets and community organizations. Static displays of fishing safety, written material and verbal advice from the trained field officers, were the educational tools used for on-site promotion of fishing safety. The findings of the initial study were reported back to the participating organizations who decided that the project would be continued for an additional two years (Moran, 2006). At the end of the three-year period in 2008, the project was extended for another two years, and the information obtained from annual surveys conducted from 2006 to 2010 provided the data for this paper. Full details of the safety promotion and its' resources are available by searching on rock fishing at: www.watersafe.org.nz/.

The purpose of this paper is to report on what changes have taken place in fishers' safety knowledge, attitudes, and behaviors over the five-year period of the project from 2006 to 2010. It also provides opportunity to reflect on the possible impact of the targeted fisher safety promotion and make recommendations for future drowning prevention initiatives based on the accumulated data.

Method

The original cross-sectional study conducted in 2006 used survey methodology to gather data and was repeated in four subsequent years up to and including 2010. It was considered that the five consecutive sets of data would provide some indication of any temporal changes in fishers' practices and perceptions of water safety and thus might indicate the impact of the annual fishing safety intervention. The project was unusual in drowning prevention research in that it allowed for a cyclic research model rather than a linear response model that typifies many public health interventions. It provided the opportunity to use an "action research" model that initially identified fishers' safety beliefs and behaviors and then integrated the findings of

the end-of-season survey (in 2006) into the subsequent prevention program in the following year. This reflective and dynamic process was then repeated at the end of each year from 2007 to 2010.

Participants

As previously reported (Moran, 2008), participants were either fishing from the chosen sites or in transit to and from the sites. Rock fishing was routinely defined as not only fishing with rod and reel but also included activities such as gathering shellfish from the rocks. Potential participants were approached, the purpose of the project explained, and a request to voluntarily participate in an anonymous written survey was made to all adult fishers over 16 years of age. The study used a convenience-base sampling technique where the data collection took place at the summer weekends during daylight hours at four preselected high risk sites (where fatal drowning incidents had occurred in the previous five years) during the end of the summer seasons for 2006–2010. It thus excluded any fishers who were fishing during weekdays, at night, outside the summer season, or at west coast sites other than those selected.

Given that most fishers in the initial survey (Moran, 2006) self-identified as of Asian ethnicity, subsequent questionnaires were produced in English, Mandarin, and Korean. To further assist non-English speaking Chinese/Taiwanese fishers, several of the field officers employed each year were fluent Chinese speakers.

Procedures

The structured written questionnaire was anonymous, designed to be completed on site, and take a maximum of 10 minutes to complete. The questionnaires contained 14 questions, eleven of which had been included in the original 2006 survey. The study protocol was approved by the appropriate institutional ethical review board and standard human subject procedures employed each year of the study. Five questions sought sociodemographic information on gender, length of residency, age, ethnicity, and their previous rock fishing activity. Two questions on fishing behaviors and perceptions of drowning risk from the initial survey were included to compare fishing safety behaviors and attitudes. Fishers were asked to self-report on six behaviors (for example, “When rock fishing, do you wear a life jacket/buoyancy aid?”), using four response categories *never*, *sometimes*, *often*, and *always*. Attitudes toward fishing safety were obtained via a series of 12 statements that required fishers to state whether they *strongly agreed*, *agreed*, were *unsure*, *disagreed*, or *strongly disagreed* with the statement. A five-part question asked fishers to estimate whether their knowledge, attitudes, and behaviors (as well as that of fishing mates and other fishers) had improved in the intervening year by using three response categories—*agree*, *disagree*, or *don’t know*.

Data Analysis

Data from the completed questionnaires were entered into a Microsoft Excel 2003 spreadsheet for statistical analysis using SPSS Version 16.0 in Windows. As was the case in the initial 2006 survey, data were analyzed using sociodemographic variables that included gender, age group, length of residency, and ethnicity. Confidence intervals were used to determine significant differences between dependent

variables (such as behavior and attitudes) and independent variables (such as gender and ethnicity).

In this paper, important data on demographic structure of the fisher cohorts and self-reported behavioral responses are presented in tabular form for the latest survey conducted in 2010 and then compared with compatible data from the 2006 survey. To illustrate trends in responses over the five years in which data were gathered from 2006 to 2010, key variables have been represented in bar graphs. Full results of each of the five annual surveys from 2006 to 2010 are available at the following website: www.watersafe.org.nz/page.asp?page=342.

Results

Fisher Demographics, 2006–2010

Table 1 shows the gender, ethnicity, and residency of fishers for the 5 years from 2006 to 2010. While the number of fishers participating in the annual surveys varied ($N = 1676$, $M = 168$, range 250–107), the proportions did not. As was the case in previous years, the sample population in 2010 was predominantly male and most were aged between 16–44 years. Proportionally more Asian and Pasifika peoples took part in the annual surveys. The English language version of the 2010 survey was completed by more half of the fishers (58%; $n = 62$), 24 (22%) fishers completed the Korean version, and 21 (20%) fishers opted to complete the Mandarin language version of the survey.

Fewer European than non Europeans took part in the 2010 survey. Most fishers were of short-term (< 4 years) or medium-term (5–9 years) residency, except in 2008, when almost half (48.9%) had been resident for >10 years. A five-year comparison of the frequency of visits to the site where the fisher completed the survey

Table 1 Sample Demographics by Gender, Ethnicity, and Length of Residency, 2006–2010

| | 2006 (N = 250) | 2007 (N = 112) | 2008 (N = 241) | 2009 (N = 128) | 2010 (N = 107) |
|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Male | 91.6% | 88.4% | 85.5% | 83.6% | 83.2% |
| Female | 8.4% | 11.6% | 14.5% | 16.4% | 16.8% |
| European | 33.2% | 23.2% | 28.9% | 16.4% | 15.9% |
| Maori | 6.4% | 10.7% | 14.0% | 6.2% | 2.8% |
| Pasifika | 9.6% | 16.1% | 9.4% | 7.0% | 11.1% |
| Asian | 49.2% | 45.5% | 44.7% | 70.0% | 63.6% |
| Other | 1.6% | 4.5% | 3.0% | 2.3% | 6.5% |
| 16–29 years | 37.2% | 43.8% | 39.6% | 34.4% | 36.4% |
| 30–44 years | 42.8% | 43.8% | 30.2% | 33.6% | 31.8% |
| 45+ years | 20.0% | 12.5% | 30.2% | 32.1% | 31.8% |
| < 4 years resident | 42.0% | 36.6% | 25.1% | 31.2% | 46.8% |
| 5–9 years resident | 17.6% | 27.7% | 26.0% | 29.8% | 31.8% |
| > 10 years resident | 40.4% | 35.7% | 48.9% | 39.0% | 31.4% |

consistently indicated that for each year, many fishers were not regular visitors to the sites where they fished. For almost one-third of the fishers ($M = 31.4\%$), the day of survey completion was their first visit to the site, and only one-third ($M = 33.6\%$) had visited the site more than six times previously. Cumulatively, two-thirds of fishers ($M = 65.8\%$) had visited the site where surveyed less than five times over the five-year period, a frequency unlikely to allow for the accumulation of an extensive knowledge and experience of the hazards associated with the site in a range of environmental conditions (i.e., variable state of tides, swell, and weather conditions).

Participation in Fisher Safety Project, 2006–10

More than two-thirds of fishers (68%; $n = 74$) surveyed in 2010 reported that they had not taken part in any previous west coast rock fishing safety surveys. As was the case in previous surveys, it appears that the fishing population of the west coast was quite transient. Of the fishers in 2010 who had taken part in previous surveys, slightly less than three-quarters (71%; $n = 24$) considered that the campaign had been *highly successful/successful*, compared with less than one-fifth who either considered it *slightly/not successful* (18%; $n = 6$) or who *did not know* (11.8%; $n = 4$). Fishers in 2010 were also asked whether they were aware of the current safety project. In the four follow-up years since the inception of the West Coast Fishing Safety Project in 2006, almost two-thirds of fishers ($M = 64.8\%$) surveyed each year were not aware of previous safety projects.

Fisher Safety Behavior, 2006–2010

Table 2 shows the self-reported fishing behaviors in 2010 compared with 2006, the first year of the project. No significant changes were reported in behaviors such as turning your back to the sea when fishing, taking a cell-phone when fishing, and checking weather/water conditions before setting out.

Table 2 Comparison of Fishers' Self-Reported Water Safety Behaviors, 2006 and 2010

| When fishing from rocks do you ... | 2010 ($n = 107$) 2006 ($n = 250$) | Never n % | | 95% Confidence levels | |
|---------------------------------------|--|----------------|-----|-----------------------|-------------|
| | | | | Lower bound | Upper bound |
| Wear a life jacket | 2010 | 37 | 34% | 0.25 | 0.43 |
| | 2006 | 180 | 72% | 0.66 | 0.78 |
| Turn your back to the sea | 2010 | 59 | 55% | 0.46 | 0.64 |
| | 2006 | 146 | 58% | 0.52 | 0.64 |
| Wear gumboots or waders | 2010 | 48 | 45% | 0.36 | 0.54 |
| | 2006 | 159 | 64% | 0.58 | 0.70 |
| Drink alcohol | 2010 | 63 | 59% | 0.50 | 0.68 |
| | 2006 | 200 | 80% | 0.75 | 0.85 |
| Take cell phone | 2010 | 7 | 7% | 0.02 | 0.12 |
| | 2006 | 24 | 10% | 0.06 | 0.14 |
| Check weather beforehand | 2010 | 6 | 6% | 0.02 | 0.10 |
| | 2006 | 11 | 4% | 0.02 | 0.06 |

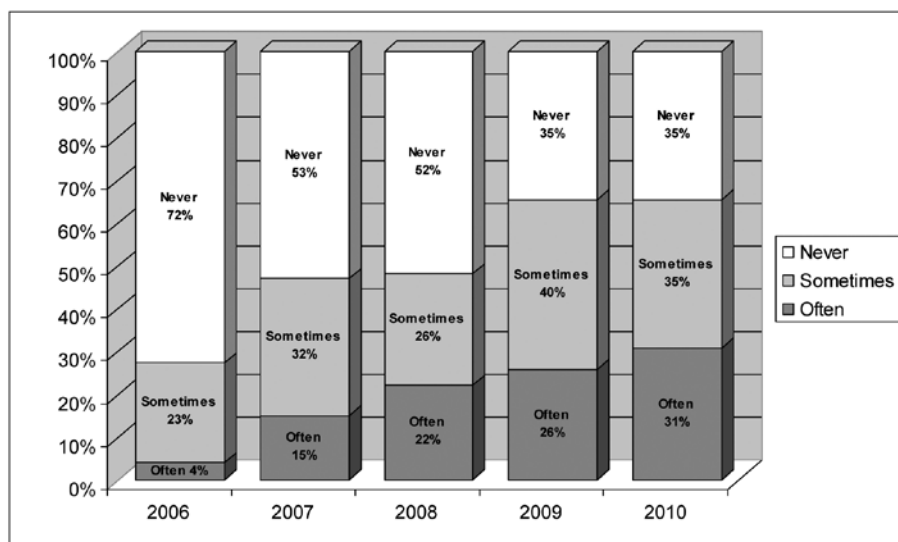


Figure 1 — Fishers self-reported use of life jacket when fishing from rocks, 2006–2010.

The most significant change in self-reported behavior related to the increased use of life jackets with 34% (95% CI = 0.25–0.44) of fishers in 2010 compared with 72% (95% CI = 0.66–0.77) in 2006 reporting never wearing a life jacket. Figure 1 illustrates the consistency of change, with an annual decrease in the number of fishers *never* using life jackets when fishing from rocky coastlines and an annual increase in the number of fishers wearing them *sometimes* or *often*.

Significant differences were also evident in a reduced number of fishers wearing gumboots or waders with 45% (95% CI = 0.36–0.54) in 2006 compared with 64% (95% CI = 0.63–0.76) in 2006. One negative change in behavior was reported in alcohol use with 54% (95% CI = 0.49–0.67) of fishers never drinking alcohol when fishing in 2010 compared with 80% (95% CI = 0.75–0.85) in 2006.

Fisher Perceptions of Safety, 2006–2010

Some positive changes over the five years of the study were identified in relation to perceptions of the severity of the risk of drowning and vulnerability to the risk of drowning. Responses that seemed to indicate resistance to change in perceptions of the efficacy of preventive actions in general and self-efficacy of preventive actions persisted. Full details of all responses are available in the report entitled *Water Safety and Auckland's West Coast Fishers 2010* at the following website: www.watersafe.org.nz/page.asp?page=342.

Figure 2 shows that fishers' awareness of the severity of the risk of drowning associated with fishing at the west coast increased over time.

Perceptions of the efficacy of preventive actions such as avoiding fishing in bad weather (2006, 86%, vs. 2010, 86%) did not change. In terms of self-efficacy of preventive behaviors, slightly fewer fishers still believed that their local knowledge of the site would keep them safe (2006, 50%, vs. 2010, 40%) but, equivocally,

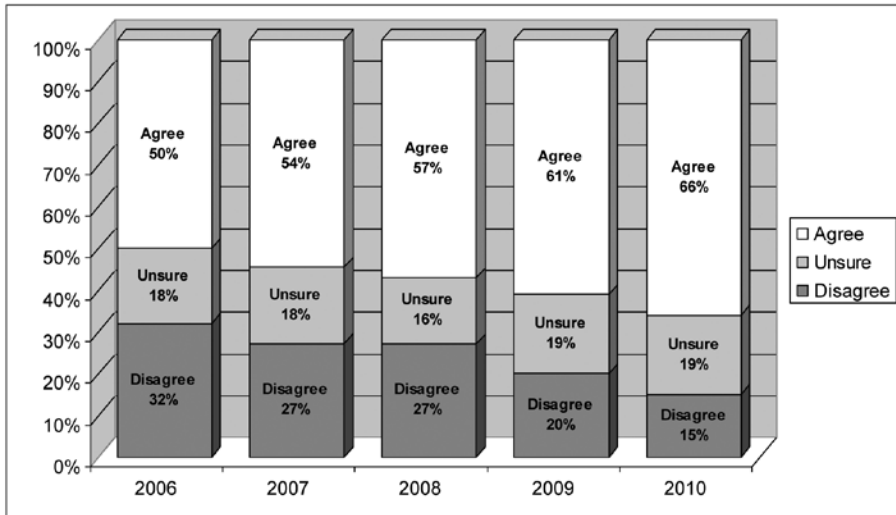


Figure 2 — Fisher responses to the statement that “drowning is a constant threat to my life when fishing from rocks,” 2006–2010.

more fishers agreed that their knowledge of the sea would keep them safe (2006, 20%, vs. 2010, 33%).

Discussion

This is the first study on fisher drowning prevention to report annually on the implementation of a water safety education campaign over five years and its effects on the safety knowledge, attitudes, and behavior of a group engaged in high risk aquatic activity.

It is concerning that so few fishers (48%) were aware of the fishing safety project. Several possibilities may explain this. First, as was reported in previous surveys, many of the participants were relatively infrequent visitors to the sites where they were interviewed. Second, many of the participants were of recent residency. Third, many fishers (42%) completed the survey in a language other than English, which suggests that targeted promotion of the campaign may not have reached those of culturally and linguistically diverse backgrounds, a problem also reported in water safety campaigns in Australia (Mitchell & Haddrill, 2003). Fourth, the remoteness of the sites and the logistic difficulties of providing on-site information to a transient population as identified above makes the promotion of the campaign very problematic. Given the cultural and linguistic diversity of the rock fishing community, the use of nontraditional avenues of communication need to be further explored.

Changing the extensive risky fishing practices reported in the 2006 survey provided a major challenge to the ensuing educational intervention. One particularly important behavioral change that appears to have been the consequence of the intervention is the increase in life jacket use. Significantly fewer fishers in 2010,

34% compared with 72% of fishers in 2006, reported never wearing a life jacket. More importantly, Table 2 shows that the confidence intervals do not overlap, thus representing a significant improvement in reported safety behavior. As was suggested in the 2007 report (Moran, 2007), further exposure to the sight of fishers wearing inflatable jackets at high-risk locations, publicity about the convenience and survival benefits of such jackets, and the sale of jackets at reduced prices should all continue to be strategies in future on-site fishing safety campaigns. A change of this magnitude in the voluntary wearing of protective gear (31%) may be an important precursor to the successful implementation of safety legislation to make the wearing of buoyancy aids compulsory at designated high-risk fishing sites. In contrast to the success reported in this study, recent evidence from Australia suggests that, as was the case in New Zealand at the start of this campaign in 2006, over 80% of Australian fishers recently surveyed never or only sometimes wore life jackets (Mathews, Thompson, & Bracchi, 2010).

With the exception of the nonuse of life jackets, other at-risk behaviors have not diminished over the years. It is likely that the increased life jacket use reflects the priority that this message was given during the safety promotion but why other unsafe behaviors did not change as a consequence of similar safety promotion throughout the program is difficult to explain. Contributing factors that may explain this persistence include the predominance of males among fishers (83%), the transience of the fisher population (only one-third of respondents had taken part in a previous survey), and the culturally and linguistically diverse nature of the population (with 43% of respondents having completed the non-English version of the questionnaire). Finally, many of the respondents in each year of the study had lived for less than four years in New Zealand (2010, 36%). As stated in a previous study (Moran, 2008), any one of the above factors may make the task of changing risky attitudes and behavior challenging. Taken collectively, the combined effects of a predominantly male population, transitory participation, infrequent visits to the fishing sites, English as a second language, and recent residency offer strong reasons why changes in attitude and behavior appear resistant to change.

Whether the attitudinal shifts toward a more realistic appreciation of the dangers associated with fishing from rocks leads to a concomitant shift toward safer behavior is difficult to determine. While the evidence of heightened awareness of the severity of the risk of drowning and greater vulnerability to that risk is encouraging, the resistance to changes with regard to the efficacy of preventive actions suggests firmly entrenched attitudes or, at least, behaviors. Given the male propensity to overestimate their ability to cope with that risk in an aquatic context, as previously reported among fishers (Moran, 2008), among American males (Howland, Hingson, Mangione, Bell, & Bak, 1996), and New Zealand male beachgoers (McCool, Ameratunga, Moran, & Robinson, 2009; McCool, Moran, Ameratunga, & Robinson, 2008), it appears that changing the mindset of fishers will be an ongoing challenge.

Limitations

The results of this study, conducted over a five-year period, although providing valuable evidence, should be considered in light of several limitations. First, although the surveys were conducted at the same sites, at the same time of the year, and using the same data gathering methods, the subjects of the convenience

samples differed each year, so direct comparisons of individual change cannot be estimated. In particular, changes in sample composition from year to year (such as proportionally fewer Europeans than non-Europeans) make specific analysis difficult. Furthermore, the numbers of fishers participating each year varied quite considerably, primarily because of variable weather and water conditions at the time of survey. Aggregated cross sectional data differences were therefore the proxy measure used to infer possible changes in beliefs and behaviors over time.

Second, use of self-reported data on safety behaviors reported in each of the annual self-complete surveys may have introduced bias that may not reflect actual behavior (Howland et al., 1996; Robertson, 1992). Third, the availability of the surveys in other languages after the first year of the study may have influenced the responses. Fourth, as each study was cross sectional in nature, only associations rather than causality can be determined. These limitations notwithstanding, this study offers strong indication about fishers entrenched as well as changing safety practices and beliefs and provides water safety educators with a clearer focus for future initiatives.

Conclusion

This is the first study of its kind to report from five years of annual data collection on an intervention aimed at reducing death by drowning among a high-risk group of recreational fishers—those that fish from rocky coastlines around surf coasts. Further observational studies are required to verify improvements reported anecdotally by lifeguards, park rangers, and by annual surveys, especially with regard to the reported increases in life jacket use. Paradoxically, the limited, but positive changes observed across the years suggests a strong need to continue funding for the fishing safety interventions that are part of this project rather than curtailing them.

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